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AMSAM-EN-EV Research and Development

Field Demonstration of Alternative Coatings for High Strength Steel (HSS)

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Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE JAN 2006		2. REPORT TYPE		3. DATES COVERED 00-00-2006 to 00-00-2006	
4. TITLE AND SUBTITLE Field Demonstration of Alternative Coatings for High Strength Steel (HSS)				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Army Aviation and Missile Life Cycle Management Command ,AMSAM-EN-EV,Redstone Arsenal,AL,35898				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES 26th Replacement of Hard Chrome and Cadmium Plating Program Review Meeting, January 24-26, 2006, San Diego, CA. Sponsored by SERDP/ESTCP.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 27	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



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Overview

- **Background**
- **Purpose**
- **Objective**
- **Test Protocol**
- **Firing Demo**
- **Results**
- **Summary**

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Background

- Cadmium
 - Toxicity
 - Exposure
- Environmental Impact
- Weapon Systems



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Weapon Systems



Multi-Launch Rocket System (MLRS)

Army Tactical Missile System (ATACMS)



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Purpose

- The purpose of this field demonstration is to determine corrosion protection imparted by various alternative coatings for high strength steel (HSS) fasteners
- Natural and severe environments experienced on rocket motor launchers

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Objective

- Identify a coating or coatings that perform as well or better than cadmium for applicability on high strength fasteners utilized by Army rocket motor launchers



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Test Protocol

- Coatings
- Coupons
- Configuration
- Primer
- Topcoat
- Test Fixture



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Alternative Coatings

- Cadmium
 - electrodeposited
- Zinc
 - electrodeposited
- Elisha
 - mineralization
- Dacromet
 - coating
- Geomet
 - coating
- Zinc-Nickel
 - electrodeposited

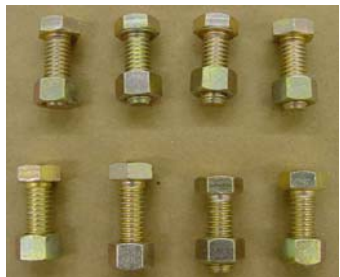
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Coated Fasteners



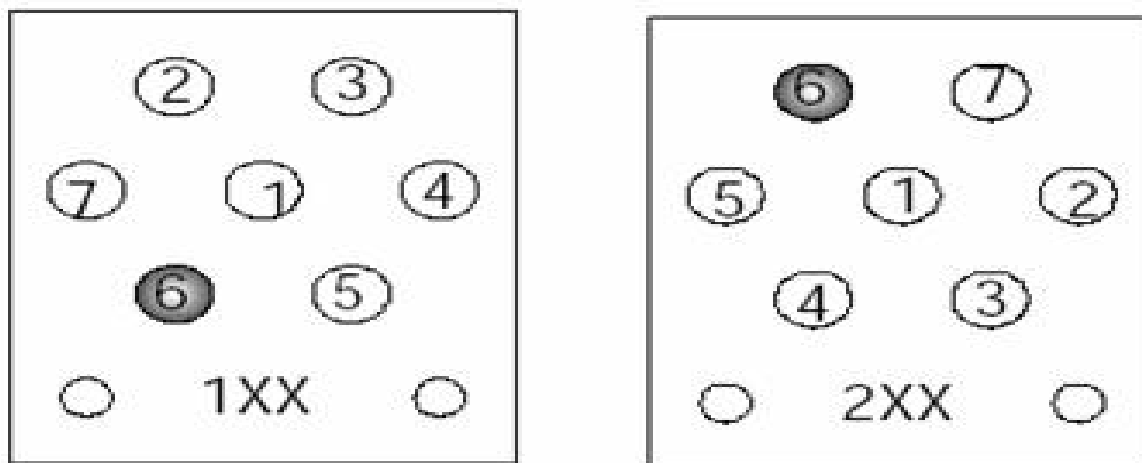
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Configuration



Torque values were based upon:

- 90% yield strength
- Manufacturer's recommended value

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Installed Fasteners



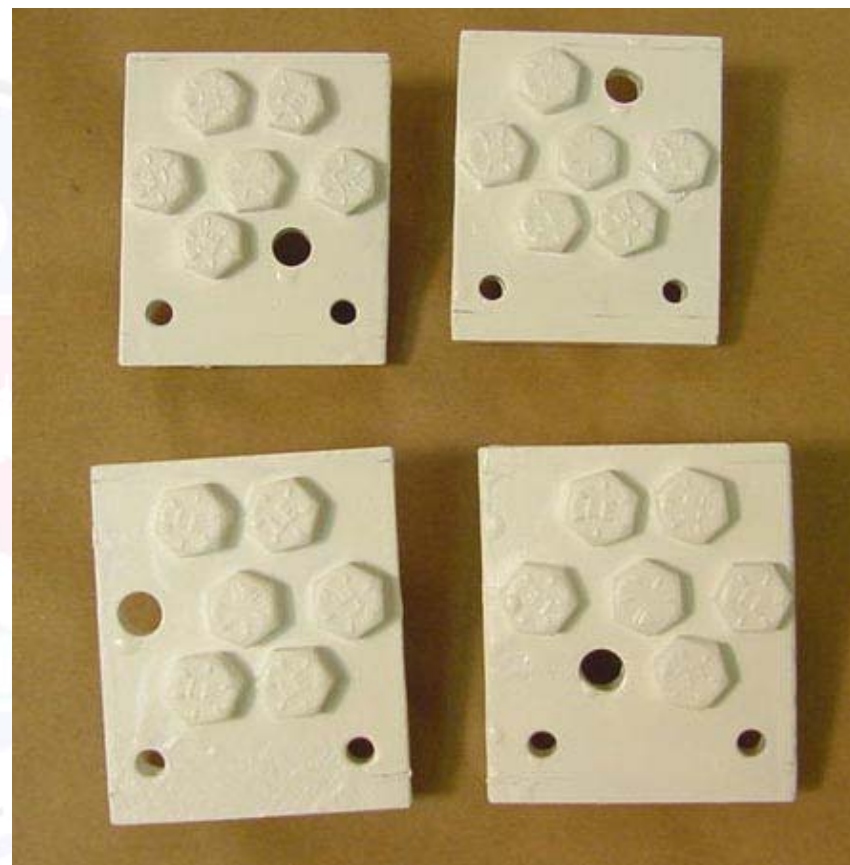
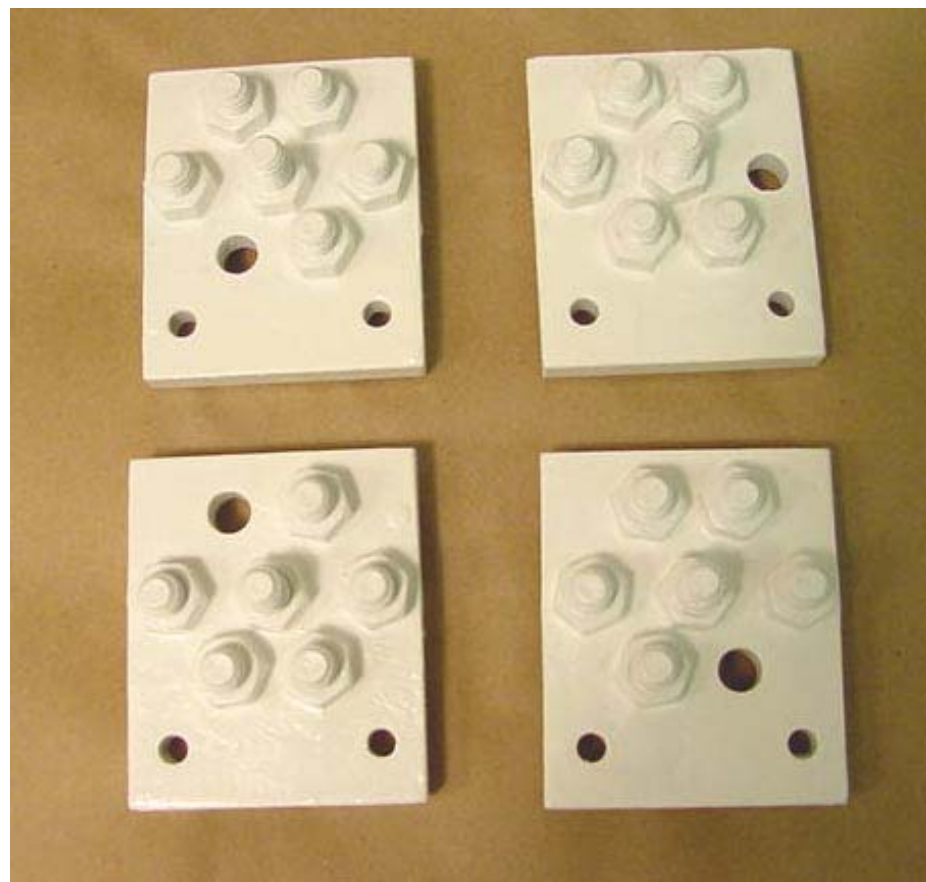
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Primed Coupons and Fasteners



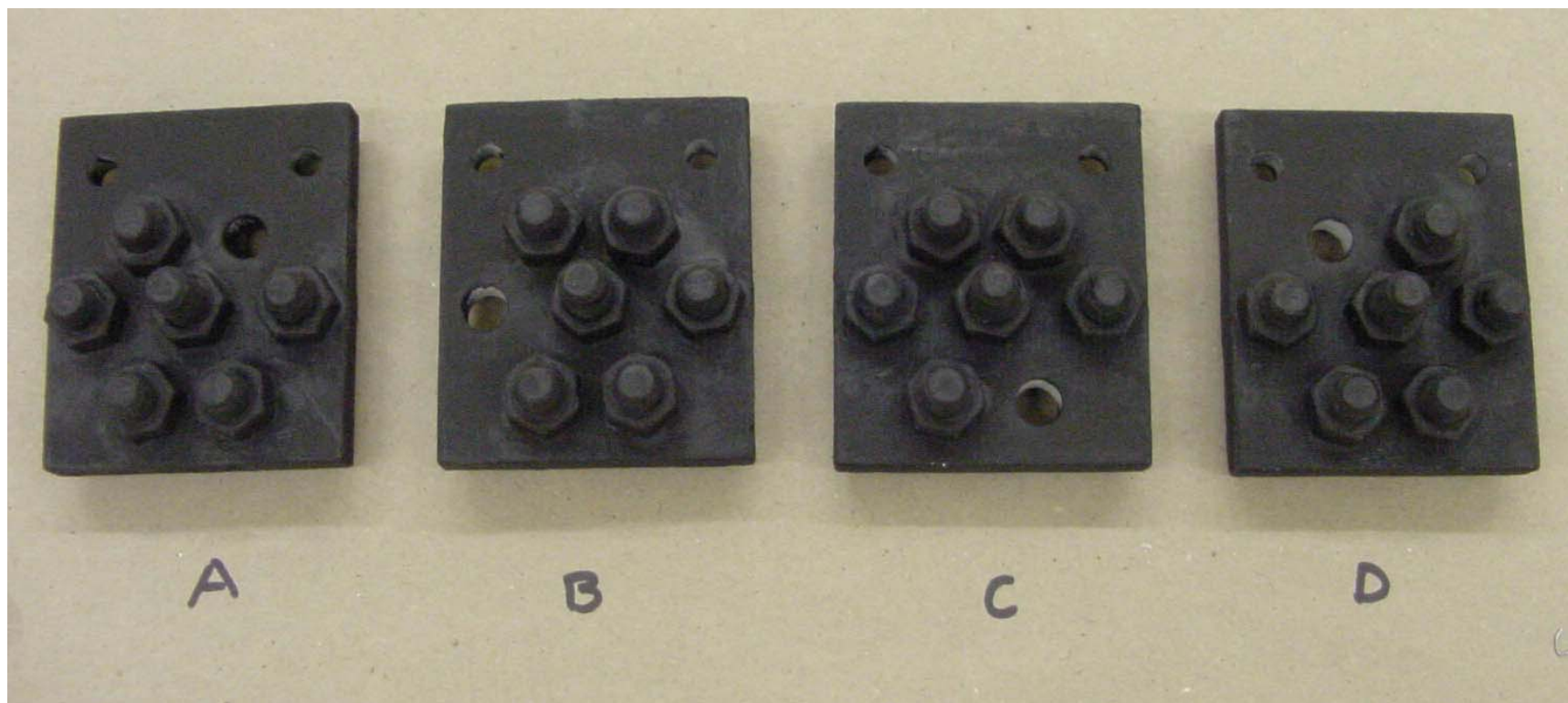
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Coupons and Fasteners w/ Topcoat



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Test Fixture



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Static Firing



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Results

- Visual Inspection
 - 6 month exposure
 - 12 month exposure
- Torque and Breakaway torque
- Tensile testing

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6 Months



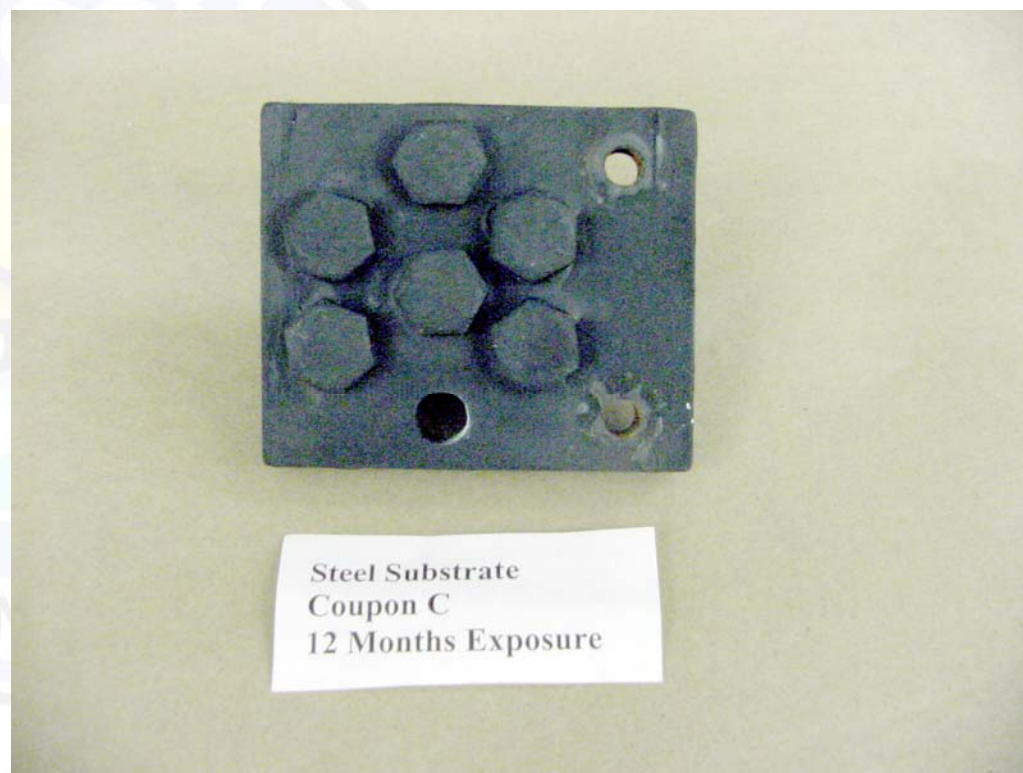
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12 Months



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Uninstalled Fasteners



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Torque Value

Coating	μ	Torque Value
Cadmium	0.08	50 ft lbs
Zinc	0.11	46 ft lbs
Elisha	0.13	53 ft lbs
Dacromet	0.11	46 ft lbs
Geomet	0.11	46 ft lbs
Zinc-Nickel	0.08	70 ft lbs

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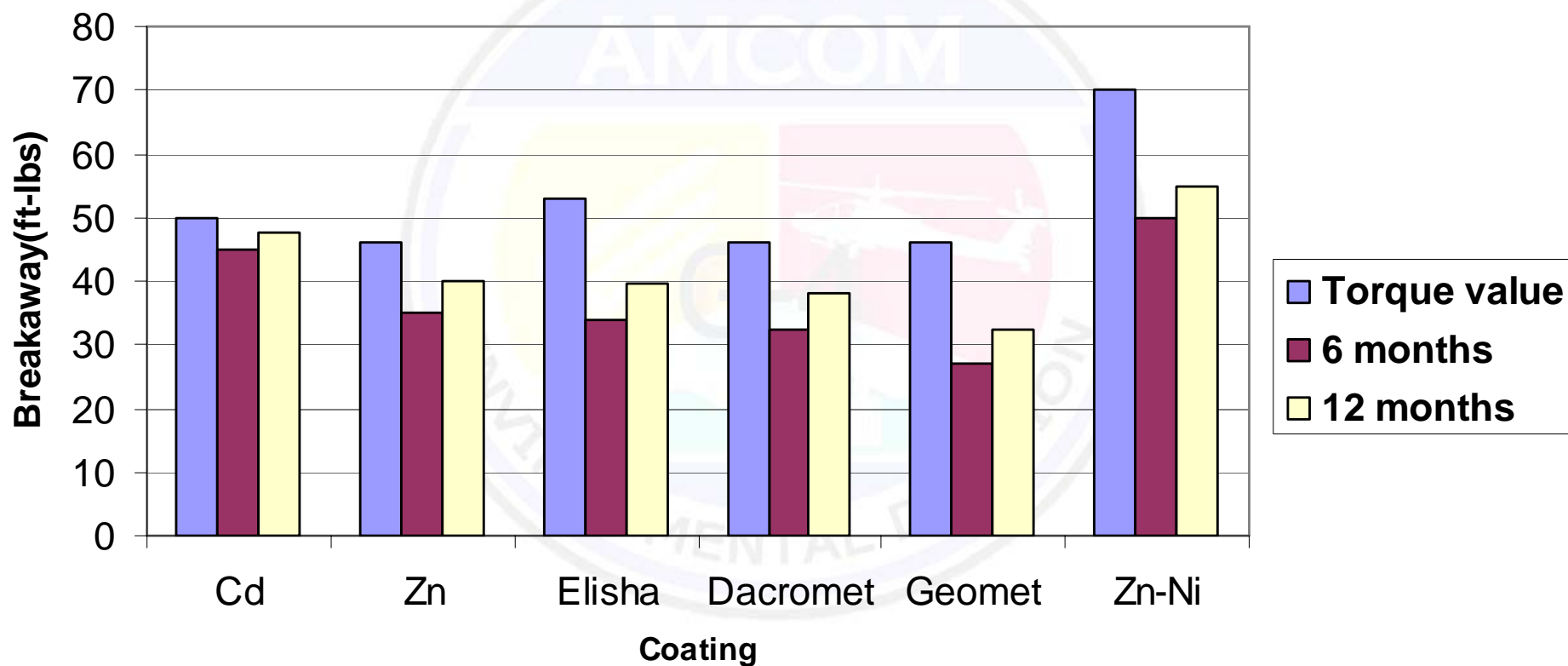


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Breakaway Torque

Aluminum Coupon



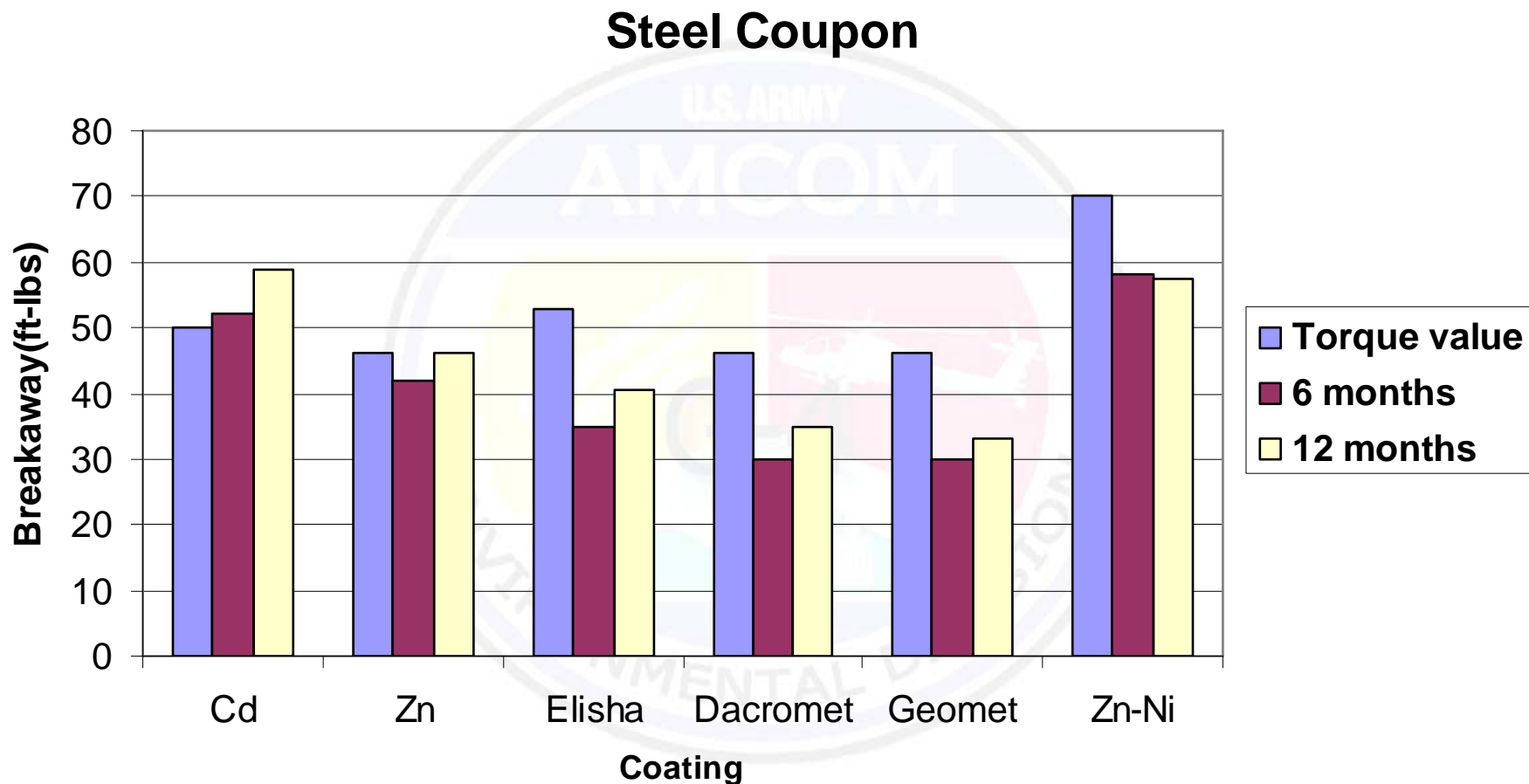
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Breakaway Torque



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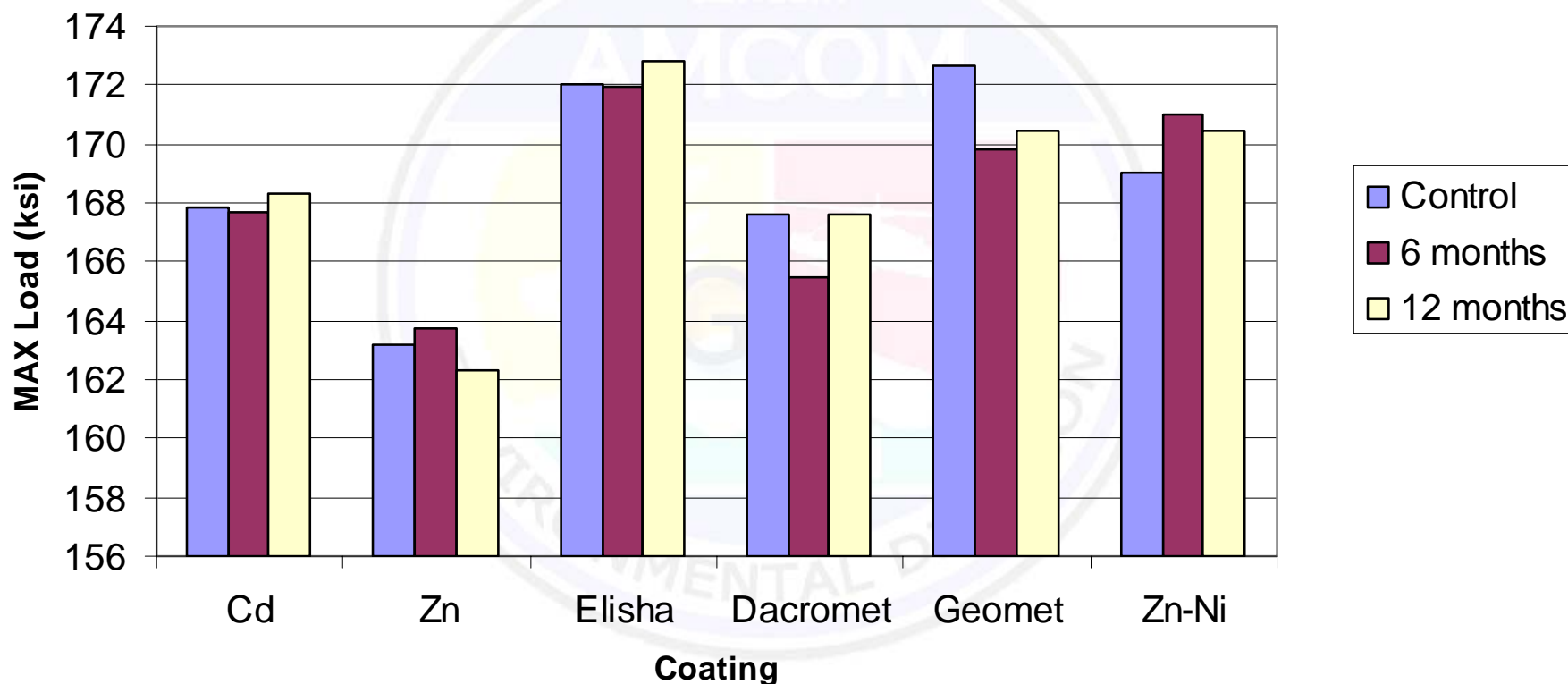


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Tensile Strength

Aluminum Coupon



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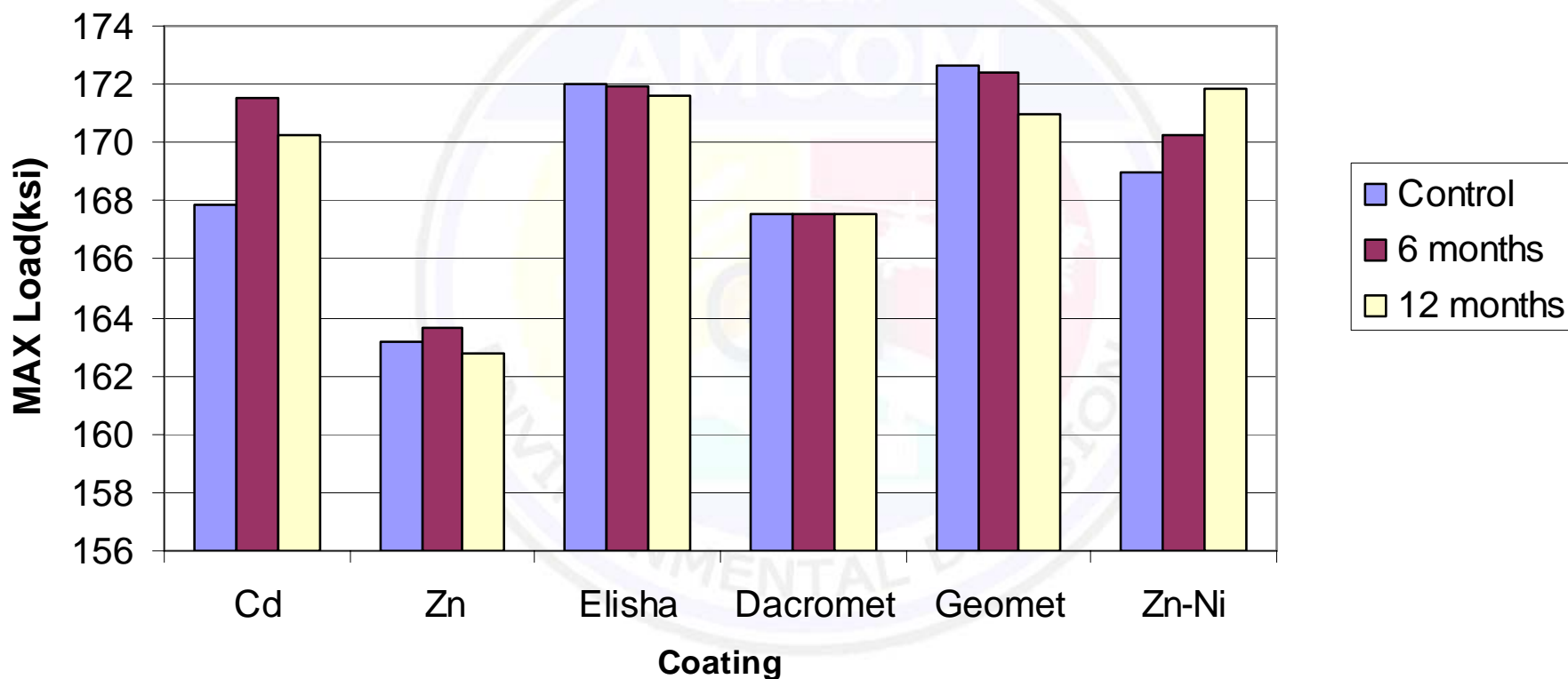


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Tensile Strength

Steel Coupon



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Summary

- Scheduling
- Points of Contact



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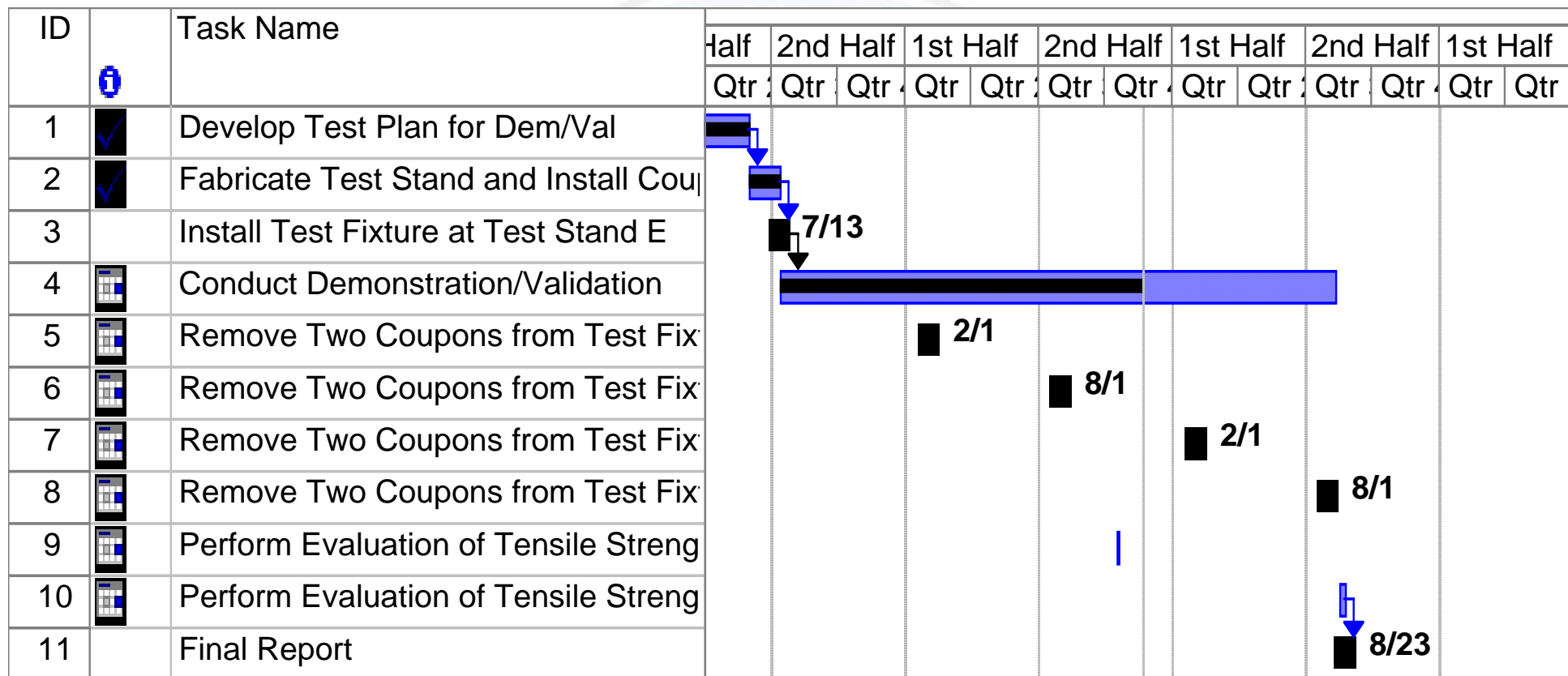


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Schedule

Field Demonstration of Cadmium Alternatives on HSS Fasteners



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